

September 2001

AIR FORCE MATERIEL COMMAND
**LEADING
EDGE**



**Air Force flight
begins with AFMC**

LEADING EDGE

Headquarters
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Wright-Patterson Air Force Base,
Ohio

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*Department of Defense
Thomas Jefferson Awards
First Place, Magazine Format,
1996
Second Place, 2000, 1998, 1997,
1995*

*Air Force Media Awards
First Place, Magazine Format,
1998, 1997, 1996, 1995, 1994
Second Place, 1993, 1992
Third Place, 1999*



This funded Air Force magazine is an authorized publication published monthly for the people of the Air Force Materiel Command. Contents of LEADING EDGE are not necessarily the official views of, or endorsed by, the U.S. Government, the Department of Defense or the Department of the Air Force. The editorial content is edited, prepared and provided by the Public Affairs Office of Headquarters Air Force Materiel Command, 4375 Chidlaw Rd., RM N152, Wright-Patterson AFB, Ohio 45433-5006. The magazine can be found on the Internet on AFMC/PA's home page: https://www.afmc-mil.wpafb.af.mil/HQ-AFMC/PA/leading_edge/index.htm. Photographs are official U.S. Air Force photos unless otherwise indicated. Distribution ratio is 8:1. For submission and writers' guidelines, contact the editor at the above address or DSN 787-7602 or (937)257-1203. Send e-mail to: Elizabeth.VanHook@wpafb.af.mil



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Front and back cover graphic design by SSgt. John Carty, HQ AFMC/CVEP

4 - 14 AFMC's Flying Mission — a team effort

Air Force Materiel Command's flying mission is multi-faceted. It includes testing, modifying and enhancing all AFMC assets — from the newest aircraft to the most ancient planes still flying. AFMC crew members, scientists, engineers and pilots work daily to perform a mission vital to the Air Force's continued success.

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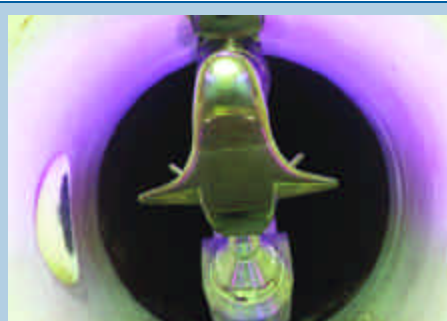
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Back cover photo was taken by the late Mr. Judson Brohmer, a civilian aerial photographer with the 416th Flight Test Squadron at Edwards Air Force Base, Calif. He and test pilot Maj. Aaron George died July 17 in a crash of an Edwards F-16 jet fighter aircraft east of China Lake Naval Air Warfare Center.



Wind tunnel tests aid X-37 design flight tests

ARNOLD AIR FORCE BASE, Tenn. — Data collected during two series of wind tunnel tests at Arnold Engineering Development Center will contribute to the final design and support of upcoming flight tests for Boeing's X-37 advanced technology vehicle.

Conducted for Phase II of Boeing's X-37 wind tunnel test program, the tests occurred in the center's von Karman Gas Dynamics Facility wind tunnels. In this test, a 6-percent scale, final configuration model of the Boeing X-37 was tested. The test examined the effects of airflow on the vehicle's aerodynamics at speeds ranging from Mach 1.5 to 5.

During this round of wind tunnel tests, engineers acquired data to determine aerodynamic jet interaction effects from plumes of small reaction control system jets located near the rear end of vehicle model.

Derived from the Air Force's X-40A, a Boeing prototype space maneuver vehicle, the X-37 focuses on reducing the cost of space access through advanced space technologies.

The first of several X-37 flight tests from the B-52 aircraft is scheduled for September 2002. According to NASA officials, two orbital missions are planned, one in 2002 and the other in 2003. During these missions, the X-37 will remain in orbit up to three weeks before reentering the earth's atmosphere and gliding to a runway landing.

— Information provided by AEDC Public Affairs

X-35B makes short takeoff, vertical landing

EDWARDS AIR FORCE BASE, Calif. — The supersonic Lockheed Martin Joint Strike Fighter X-35B made a successful short takeoff, transitioned back from wingborne to jetborne flight and made a picture-perfect vertical landing here July 16.

The soft touchdown followed a series of flights in which the X-35B achieved successively slower speeds with its short takeoff, vertical landing system activated. The aircraft executed several successful short takeoffs and "slow landings."

The aircraft completed 17 vertical takeoffs, hovers and vertical landings at the Lockheed Martin plant in Palmdale, Calif. On July 9, it performed a short takeoff and vertical landing conversion, a mid-air refueling and supersonic dash in the same flight.

— Information provided by AFFTC Public Affairs

Teamwork "pins" helicopter problem for a quick fix

ROBINS AIR FORCE BASE, Ga. — To prevent the grounding of HH-60 Pave Hawk helicopters, the technology and industrial support directorate here took on the task of repairing failing pins used to hold the rotors onto the helicopter.

The request for this service came from the Special Operations Forces System Program Office after 52 of the 105 Air Force HH-60s were affected by the failing pins. Aircraft affected were at every HH-60 base.

After being contacted by Special Operations, Robins produced four sample pieces and was given the go-ahead to do the job. Less than a week later, the industrial products division was producing parts.

"Warner Robins stood up to this challenge in a responsive and timely fashion," said Col. David Lee, deputy director of Special Operation Forces. "While negotiations are still under way with industry to get replacement production pins, the industrial products division is building parts and we are shipping to the units now."

— Information provided by WR-ALC Public Affairs

Marines test amphibious assault vehicle at Eglin

EGLIN AIR FORCE BASE, Fla. — Test teams at Eglin recently helped Marine Corps officials test their Advanced Amphibious Assault Vehicle's firepower and performance.

Marine experts said the vehicle is armed with a 30 mm cannon and a coaxial machine gun and is slated to be an improved version of the current amphibious assault vehicle already in the Marine arsenal. Its mission will be to carry combat infantry Marines from Navy ships beyond the horizon ashore and to support them once ashore with maneuverability and firepower.

The 76,000-pound vehicle races across the water at 30 knots, nearly 35 mph and more than 40 mph on land, which is twice as fast as the old vehicle on land and three times as fast in the water.

The vehicle is far from its 2006 completion date, however these successes expand Eglin's opportunities to be the site for other similar tests.

— Information provided by AAC Public Affairs

Rome awards \$4.9 million research contract

ROME, N.Y. — The Air Force Research Laboratory Information Directorate has awarded a contract to Emergent IT of Vienna, Va., for research to improve the fusion of information.

Fusion Research Development, a four-year agreement, is funded by a variety of Defense Department organizations, including the Defense Advanced Research Projects Agency. The Emergent IT research provides the ability to fuse a broad range of information across the command and control, intelligence, surveillance and reconnaissance arena, thereby expediting the development and evaluation of fusion algorithms and related technology.

Research will focus on Targets Under Trees, a joint program between AFRL directorates. The resulting technology may benefit law enforcement and public safety, traffic pattern monitoring and identification of illegal activities.

— Information provided by AFRL Public Affairs

Air Force flight begins with AFMC

The Air Force's flying mission would stop if Air Force Materiel Command didn't do its job.

"If we didn't fly 'em, they wouldn't exist," said Lt. Col. John Ingham, AFMC's current operations and rated management chief. This is the core truth behind what the colonel calls a multi-faceted flying mission belonging to the Air Force's largest and most diverse command.

"Our job is developmental testing and that ranges from taking revolutionary, first-of-its-kind aircraft to the skies for the first time to performing functional check rides on older aircraft coming out of scheduled maintenance," he said.

Col. Ingham said without AFMC's expertise, it would be impossible to put an aircraft in the sky that would dependably do what the user wants it to do.

The AFMC fleet

Like any other flying unit, AFMC "owns" the aircraft needed to get its job done. But unlike other units, it doesn't have a large number of any particular aircraft, but a small amount of many.

In fact, AFMC's fleet includes 101 aircraft used for testing and test support, according to Col. Ingham. But those come in more than 15 types, ranging from UH-1 helicopters to B-52 Stratofortress bombers to the new F-22 Raptor air-dominance fighter.

These aircraft and accompanying crews call 17 AFMC flying units home. Scattered across North America, they range from small units with one aircraft and aircrew like the 450th Test Support Operating Location here, to the 412th Test Wing at Edwards Air Force Base, Calif. The 412th has a fleet of 68 different aircraft and is the largest flying unit in the command.

It takes a team

The command also boasts its own weather, air traffic control and maintenance capabilities.

"We fly those kinds of missions where you don't know what happens next," said Lt. Col. Lionel Alford, AFMC's airframe, propulsion, avionics and electronic warfare chief.

He said before command experts get a new developmental aircraft, extensive wind tunnel and other ground tests are accomplished to make sure the aerodynamic and flight theories work right.

"The next step for us is to put a person in the cockpit," he said.

In addition to testing new aircraft, Col. Alford said making sure aircraft coming out of routine maintenance or having new munitions or other devices added to its configuration are part of the command's flying workload.

"For every new item we put on or in an aircraft, it has to be tested to make sure it works the way it's supposed to," he said. "We don't want our operators to become inadvertent test pilots. When they step into an aircraft, they should feel comfortable they are getting into a fully tested aircraft. When a user is over Yugoslavia at night, that should not be the first time that aircraft is flying with that particular configuration."

Col. Alford noted that AFMC pilots and crews have used sci-



A B-52 approaches a KC-135R tanker to take on fuel. (U.S. Air Force photo)

entific and measured processes to find out the limits of the aircraft's envelope and have gone over what they consider to be every possible situation.

"That's so our war fighting users can feel confident and capable of doing what they do best," he said.

It doesn't come without a price

Reflecting back on history, Col. Alford said the first aircraft accident back in 1908 resulted from a lack of test and evaluation. Orville Wright and Lt. Selfridge were flying a Wright flyer with a new, longer propeller.

"Aviation propellers were such a new thing that engineers like the Wrights didn't realize that they lengthen when they rotate. The propeller cut the guide wire that held the tail of the aircraft on, so it nose-dived into the ground," he said. "AFMC's developmental test concept grew out of that event."

But AFMC's flying mission and successes don't come without a price.

Col. Alford said 52 test operators at Wright-Patterson alone have died since testing began. In fact, less than 1 percent of all Air Force pilots are test pilots; but nearly 20 percent of pilots who have Air Force bases named after them were test pilots who died in the line of duty.

"Eleven of the 59 aviators who have bases named after them were test pilots," Col. Alford said.

"Through history we've found better and safer ways of flying and testing, but we say those lessons are written in blood," he said.

Looking ahead

As far as the future goes, Col. Alford said every new item added to present aircraft or each newly developed aircraft is a new mission for AFMC aircrews.

"We support developmental test and evaluation," he said. "The contractor flies new aircraft first to prove air worthiness.

"From there, we work with the contractor to clear out and establish that aircraft's envelope, building on the science and engineering to do new and better things," he said.

— Tech. Sgt. Carl Norman, AFMC Public Affairs



Platinum Nighthawk celebrates stealth fighter's 20th anniversary

The 20th anniversary of the first flight of the F-117A Nighthawk was commemorated at Edwards Air Force Base, Calif., during June.

The F-117A Nighthawk is the world's first operational aircraft designed to exploit low-observable stealth technology.

Commemoration events drew more than 1,000 participants and eight of the 54 F-117s in the Air Force inventory to Edwards. Members of every unit currently associated with the aircraft were on hand, as well as a number of the men and women — military and civilian, government and contractor — who since the program's inception have worked to make it a reality.

The celebration was highlighted by several events, according to event coordinators.

Roundtable discussion

There was a hangar party featuring a roundtable discussion with the program's first test pilots.

"The pilots, both from Lockheed and the Air Force, provided a unique and one-of-a-kind chance for today's testers to learn what the early days of the F-117 flight test program were really like," said Capt. Dan Marticello, hangar party event lead and acting operations officer for the 410th Flight Test Squadron, Air Force Plant 42 in Palmdale.

Maj. Gen. David Deptula, director of the Air Force Quadrennial Defense Review at the Pentagon, further highlighted the celebration's commemoration efforts as he addressed a formal dinner crowd touching upon the revolutionary role of the F-117 during Desert Storm.

"The F-117's combination of stealth and precision delivery of munitions gives it a capability that cannot be duplicated by any other aircraft in the Air Force inventory."

Lt. Col. Rod Cregier, F-117 Combined Test Force

The aircraft flew roughly 1,300 sorties and scored direct hits on 1,600 high-value targets in Iraq. It was the only U.S. and coalition aircraft to strike targets in downtown Baghdad. Not one F-117 sustained combat damage during the six-week air war.

An elite group

Only 457 pilots have ever flown the F-117 operationally, and only 26 Air Force and Lockheed Skunk Works test pilots have flown the aircraft developmentally.

"For those less knowledgeable to the aircraft's specific capabilities, the celebration's 12-ship fly-by and aerial review, consisting of eight F-117s and four T-38s, was nonetheless awe-inspiring," said Capt. Skip Stolz, 410th Flight Test Squadron director of engineering.

Participating units

Every unit associated with the F-117 participated, including the 49th Fighter Wing, Holloman Air Force Base, N.M.; the operational test agency, Detachment 1 of the 53rd Test and Evaluation Group, also from Holloman; the F-117 System

Program Office, Wright-Patterson AFB, Ohio; and the Air Force Flight Test Center's 410th Flight Test Squadron, also known as the F-117 Combined Test Force.

"The Platinum Nighthawk celebration

was a resounding success," said Lt. Col. Rod Cregier, 410th commander. "The participation and camaraderie of the F-117 community, from all aspects, was overwhelming."

Mid-life improvements

Currently, the F-117 Combined Test Force is testing a variety of mid-life improvements that will maintain the aircraft's combat effectiveness through at least 2018, according to Col. Cregier.

"The F-117's combination of stealth and precision delivery of munitions give it a capability that cannot be duplicated by any other aircraft in the Air Force inventory," he said.

— 1st Lt. Cris L 'Esperance, AFFTC Public Affairs

Weathercasters predict Global Hawk success

Two Air Force staff meteorologists deployed at RAAF Edinburgh, Australia are working hard to forecast safe weather for Global Hawk Unmanned Aerial Vehicle, or UAV, missions down under.

In 12-to-15-hour shifts, the meteorologists continuously track weather conditions across 2.9 million square miles of land and sea, giving U.S. and Australian Command and Control Operators critical flight safety information.

The two officers, Capt. Glenn Kerr and Capt. Tony Krogh, assigned to the 88th Air Base Wing Weather Squadron at Wright-Patterson Air Force Base, Ohio, are part of an Air Force and government contractor team for the first overseas deployment of Global Hawk. The team's goal is to help Australian Ministry of Defence officials determine how the UAV might meet Australia's future surveillance needs.

Critical advice

Scanning up-to-the-minute weather charts and satellite reports from the U.S. Air Force Weather Agency, U.S. Naval Research Laboratory, National Oceanic and Atmospheric Administration and Australian Bureau of Meteorology, the two weathercasters record hourly data. It sounds routine, but it's anything but dull, because the operators depend on their advice to make "go or no-go" decisions on Global Hawk flights during the deployment.

"The military pilots have listened to our inputs and bombarded us with questions before making decisions about modifying Global Hawk's flight direction," Capt. Krogh said. "They really want our 'take' on the weather before they make final mission plans."

The two said their greatest challenge was Global Hawk's historic journey overnight from California to Australia in April.

Using satellite information and other data, they determined the 10 or 12 storms near Global Hawk's path would not be a threat. "We needed to identify the safest route for the UAV across 7,500 miles of ocean, where there are no weather radars or reporting stations," Capt. Krogh said. "Although the storms were very close to the UAV's track, we were able to assure the operators, based on satellite data, that Global Hawk was going to pass around them AOK," he said.

Supporting the future

The work the two forecasters are doing for the Australian deployment will be important to future overseas activities for Global Hawk. "We're helping define how military forecasters

will support this system, and other UAVs in the future," Capt. Krogh said.

Capt. Kerr said their work also supports the Australian Ground Element technicians through the collection of imagery over the ocean. "We've given them information on sea-state wave height, surface winds and cloud cover, so they could find 'targets' scattered across the ocean," he said.

Capt. Krogh attributed the duo's success to months of coordination with their Australian counterparts, before and during the deployment. "We tried to get as much information as possible before we arrived. Since then, we've talked with Australian air

traffic controllers, been up in the RAAF Edinburgh Control Tower to see the airfield, connected with Adelaide weather forecasters, and pulled up various Australian meteorological products."

Looking ahead

Two items both forecasters agree are needed for future deployments: more high- and low-level forecast products, and better long-term global weather models.

Good, reliable tropospheric and stratospheric products are hard to get because most military and civilian commercial aircraft don't fly as high as Global Hawk, Capt. Kerr explained.

"When you're briefing a crew for a Global Hawk mission 30 hours in the future, you quickly realize you have nothing but model data that far out," Capt. Krogh added. "When we share what we've learned about the 'push' and 'pull' of worldwide weather data on this deployment, it should help other forecasters working future UAV deployments."

Those commanding the deployment are praising the forecasters' pioneering efforts. "These two guys are doing a great job of keeping us in the loop, providing a critical service to the Global Hawk deployment, which is helping us learn a lot of things," said Col. Wayne Johnson, Global Hawk program director, Reconnaissance Systems Program Office, Aeronautical Systems Center at Wright-Patterson.

"Weather forecasting is critical to certain kinds of deployments, for optimizing long-distance travel," Col. Johnson said. "Having a forecast before you take off on a 30-hour sortie is a lot different from one for a two-hour sortie."

"Your whole mindset is changed about how you look at weather updates, when you've got only one runway and one approach," he said.

— Ms. Sue Baker, ASC Public Affairs



Meteorologists Capt. Glen Kerr (left) and Capt. Tony Krogh consult weather charts to help ensure safe mission routes over Australia for the Global Hawk Unmanned Aerial Vehicle. (Photo courtesy of Australian Defence Science Technology Organisation)



With the retiring of the C-141 in 2003, base leaders consider the C-17 critical to the future depot maintenance work at Warner Robins Air Logistics Center, Ga.

Currently, experts are hard at work on a C-17 Globemaster III which landed at Robins on June 13 for the first of two analytical condition inspections scheduled for the center this fiscal year.

An early start

C-17 program office officials said the inspection is a program that occurs early in the aircraft's life. It is a visual inspection where predetermined areas are targeted, and information obtained from the inspection is used to determine future depot maintenance on the plane.

"So far the inspections have gone very well," said Mr. Neil Pernell, C-17 project manager. "We have gotten the planes out on time and under budget." Since April 2000 the center has conducted four inspections and has one more scheduled for this year.

Looking to the future

Robins' leadership sees the C-17 and analytical condition inspections as a vital part of the future. "No doubt it's the future of airlift, therefore it is critical for Robins, which is heavily dependent on airlift work with the C-5, C-130 and C-141," said Maj. Gen. Dennis Haines, Center commander, who took his first flight on a C-17 last year when the first

plane arrived at Robins.

Gen. Haines said winning the C-17 maintenance workload depends on proving we're the best provider.

Mr. Pernell said the number of planes that come into the center for inspection varies each year.

"We look at different things each year," he said. "These inspections are very important to the future for us. With the C-141 retiring in a couple of years our hopes are high that we can retain our workload with the C-17s."

Standing up to wear and tear

The analytical inspection usually targets a plane's electronic and hydraulics systems to see how they have stood up to the wear and tear of flight.

"The main thrust of this C-17's visit to the center is electronic," said Mr. Pernell. "We will be looking at clamps, wiring and any cracks in the structure."

From a customer standpoint, this type of inspection gives a realistic view of how the plane is working. "It gives them a more precise look at what they have," he said.

Mr. Harris Roberts, C-17 first-line supervisor, gets his work orders from an aircraft logistics specialist and puts his men to work as soon as the plane gets in.

It takes team work

Thirty-five workers are a part of the inspection team and, depending on the task, any number of these may be at work

simultaneously. These workers include a structural and an electrical engineer from Boeing. "These same guys worked on them last year," said Mr. Pernell. "They know these planes well."

Though the C-17 mechanics are the primary workers, Mr. Pernell said that the 653rd Combat Logistics Support Squadron is also a part of the team. "Anywhere from five to 15 of them are out here on a given day."

The operational requirements of the C-17 impose demanding reliability and maintainability of the plane's system.

These requirements include an aircraft-mission-completion-success probability of 92 percent, only 20 aircraft maintenance man-hours per flying hour, and full and partial-mission-capable rates of 74.7 and 82.5 percent, respectively.

The Boeing warranty assures these figures will be met, and Robins helps to maintain this guarantee through the inspection program.

Just the facts

"Built in 1991, the C-17 can handle the U.S. main battle tank and can carry twice the payload of the C-141 that it is designed to replace. It can operate on runways as short as 3,000 feet and as narrow as 90 feet," Gen. Haines said. "It is the Air Force's most reliable aircraft and is the backbone of the airlift fleet today."

— Ms. Lanorris Askew, WR-ALC Public Affairs

339th Flight Test Squadron

Making sure the war fighter is ready to fly

Members of the 339th Flight Test Squadron at Warner Robins Air Logistics Center, Ga., know the importance of preparing the war fighter and his tools.

Known by many as the benchmark flight test squadron in Air Force Materiel Command, the 339th Squadron is the largest depot flight test organization in the command with approximately 55 personnel.

Members of the squadron like Capt. Tony Walker, flight test engineer, say the squadron's size has nothing to do with the quality of the product. Boasting three consecutive excellent ratings from AFMC's standardization evaluation inspection team, outstanding ratings by AFMC aircrew standardization evaluation teams, and zero deficiencies found during the latest unit compliance inspection by AFMC's inspector general, the men and women of the 339th give their best to make sure the war fighter is ready to fly.

"In a nut shell, we are known as the benchmark flight squadron because we do so much, so well, with so few people," said Capt. Walker.

An aggressive schedule

Currently the squadron flies more than 1,500 hours of functional test flights each year and approximately 350 developmental test and evaluation hours, finishing just after Eglin AFB, Fla., and Edwards AFB, Calif. The 339th's aggressive test scheduling ensures sustainment modifications and upgrades meet war fighter's needs.

The 339th's history began in 1942 as the flight test branch at Wellston Air Depot, now Robins. During the past 56 years the unit has tested more than 200 models of 70 different types of aircraft, and has received numerous awards and accolades for superior performance. Capt. Walker said the unit has shown itself to be composed of the best of the best by winning the USAF Flight Safety Award.

"Here at the 339th, we are like a family," said Capt. Walker. "We have a good time together. But, when it comes time for work, we know how to be professional." It's the job of the men and women of the 339th to make sure that their flight tests ensure the quality of aircraft systems for use by the war fighter.

The developmental flight tests completed by the 339th include a qualifications test and evaluation where modifications are tested to make sure that the new system is working correctly and if they are safe to be used by the operators.

"Every item we test and every glitch we find in developmental test and evaluation ensures that the operator has a safe aircraft," said Capt. Walker.

A three-pronged mission

The 339th has a three-pronged mission that includes determining post-programmed depot maintenance air worthiness of the F-15, C-130, C-141 and C-5 aircraft, providing oversight of Warner-Robins ALC flight test activity and performing flight tests and supporting aircraft sustainment activities.

"Our innovative approaches to flight test have helped us achieve the highest levels of proficiency of any air logistic center," said Lt. Col. Terry Tichenor, 339th Flight Test Squadron



Chief Master Sgt. Felix Normand, a flight test engineer in the 339th Flight Test Squadron does a pre-flight inspection on a C-130 at Robins Air Force Base, Ga. (Photo by Ms. Sue Sapp, WR-ALC Public Affairs)



Lt. Col. Terry Tichenor, 339th Flight Test Squadron commander, explains F-15 flight test procedures. (Photo by Ms. Sue Sapp, WR-ALC Public Affairs)

commander. "We've done this by teaming with the production directorates at Warner-Robins on matters of maintenance training, problem identification, constructive scheduling and off-station system product directorate missions.

"We've also reduced the war fighters' total depot time, saved

them mission time, and identified aircraft problems early by offering aircraft pick-up and delivery service,” he said.

Expertise and teamwork

The squadron continues to provide expertise and teamwork to the air logistics center in the proud traditions of both its historical forerunners under Col. Tichenor’s leadership. Capt. Walker said the current nickname “The Rogues” came from their dogged, and sometimes unorthodox, determination to maintain the highest standard of quality and safety in flight testing.

The 339th squadron has provided quality service to its customers, while ensuring the professional development and competence of its members, even though the squadron owns no aircraft. Conscious of the increased emphasis on business area soundness, 93.7 percent of the hours and 89.4 percent of the sorties flown were revenue producing.

As part of its ongoing effort to provide quality service, the squadron implemented quarterly mission reviews to provide a report card on its most visible product, depot maintenance aircraft. It allows the 339th to identify and attack the trouble spots in its product before they become a problem in the field. The result is quality aircraft delivered to the customer. All of the aircrews are qualified in all variants of the weapon system they handle. These include the C-5, C-130, C-141 and the F-15.

“When a plane comes out of programmed depot maintenance

we are able to fly them ourselves,” said Capt. Walker. The squadron is the center test authority responsible for providing oversight on all testing activities at Robins.

The 339th supported the system program offices in all test and evaluation planning, provisioning, executing, analyzing and reporting for all system upgrades valued at more than \$6 billion.

Capitalizing on individual talent

In addition, the squadron has built its niche by capitalizing on individual talent, integrating Air Force Reserve aircrews into its daily operations. “They are very intertwined in our mission, without them we wouldn’t be able to do our jobs,” said Capt. Walker. Due to the small number of active-duty members, the reserve unit is a very important tool, helping to make up the core composition on some test flights.

“Time management is the key,” said Capt. Walker. “Being a small squadron, there are many things to do in a 24-hour day.”

Capt. Walker said it takes line experience to be a part of the 339th. Most of the fliers are technical to chief master sergeants and majors or lieutenant colonels with over 500 years of combined experience.

“It is crucial that we know how the airplane is supposed to behave and understand those small peculiarities of every plane,” said Capt. Walker.

— Ms. Lanorris Askew, Rev-Up Staff Writer



Left: Maj. Dan Erickson, 339th Flight Test Squadron at Robins Air Force Base, Ga., prepares a C-5 for a test flight following programmed depot maintenance. (Photo by Mr. Gary Curtrell, WR-ALC) Right: Capt. Tony Walker, a flight test engineer in the 339th Flight Test Squadron, does a pre-flight check of his oxygen mask. (Photo by Ms. Sue Sapp, WR-ALC Public Affairs)

Flight test engineers of the USAF Test Pilot School

Teaching the "Right Stuff" — it's a team effort

The instructor flight test engineers working at the USAF Test Pilot School at Edwards Air Force Base, Calif., are dedicated men and women who are involved in every aspect of flight test training.

Along with the school's resident test pilot instructors, they are the mentors for the student test pilots, test engineers and test navigators who are selected to come to Edwards to attend the school and learn the "right stuff" of flight testing.

It's a team sport

In Tom Wolfe's novel "The Right Stuff," he tells the exciting story of the Mercury Astronauts. Blending heroism with humanity, Mr. Wolfe captured not only the bravery of test pilots facing the unknown, but also how they and their families overcame the overwhelming fame for which there was no training.

Unfortunately, the novel and the movie paid little attention to the fact that flight-testing is without a doubt a "team sport." For every test pilot who ever became famous or had his name immortalized in association with some aeronautical first, there has always been a dedicated team of support personnel behind the scenes that were paramount to success of the mission. Most crucial among the supporting cast is the flight test engineer.

No test pilot ever recognized the importance of the flight test engineer more than Gen. Charles "Chuck" Yeager, the first man to fly faster than the speed of sound. In his book *Flight Testing at Edwards — Flight Test Engineers' Stories 1946-1975* he said "Flight testing is a wonderful occupation. Where else can you be on the cutting edge of technology? Flight-testing is a team sport — a team built around the test pilot and engineer."

The early years

During the early years of flight-testing at Muroc Field, later to be renamed Edwards Air Force Base, almost all of the military test pilots were graduates of the test pilot school. However, there was no formal schooling for flight test engineers. The road to becoming a flight test engineer was through self-study and on-the-job training.

Early flight test engineers worked in relative obscurity while planning the test programs, coordinating missions and flying to gather data. They burned the midnight oil to plot and interpret what data told them and formulate the test results into a final report that could be easily read and understood.

Formal training

In the late 1960's and early 1970's, the increasing complexity of computer-driven systems and the job of testing and integrating them further highlighted the long-established compelling need for pilot-engineer teamwork in flight testing.

On February 26, 1973 at the USAF Test Pilot School a brand new Flight Test Engineer Course got underway. The flight test engineer course was the brainchild of Col. Raymond Jones, then deputy commandant of the school.

Since 1974 pilots and engineers have attended classes together and teamed up to plan and fly test missions, collect and analyze data, prepare test reports and accomplish test projects — just like they do in the real world of flight testing.

The flight test engineers have become a permanent fixture at



Instructor flight test engineers Maj. Russ Erb and Mike Phillips conduct a telemetered T-2 spin mission and monitor test point progress in one of the two telemetry rooms of the test pilot school.

the institution that was once the exclusive domain of pilots. Since the mid-1970's, flight test engineers have typically made up about 40 percent of each graduating class.

Leading the team

Another major milestone for the flight test engineers was achieved earlier this year, when Col. George Ka'iliiwai III became the first engineer to rise through the flight test ranks to become the commandant of the school.

Today the resident staff of the test pilot school is rich with experienced flight test engineers who contribute to every part of the school's curriculum, from academics to test management projects.

These engineers include military members, civil service and contractor personnel. Many are graduates of the school's flight test engineering course, and because of their depth of experience, many serve double and sometimes triple duties at the school.

Mr. Gary Aldrich, for example, is a private contractor who works full time at the school primarily as the senior glider instructor. He also serves as the school's test management project expert. A graduate of the school's Flight Test Engineer Course, he is the most senior flight test engineer on the staff.

A typical test pilot school student will graduate having flown at least 25 aircraft types not previously experienced. Examples include sister service machines such as the F-18 and F-14, foreign service aircraft such as the Mirage 2000 and Tornado, rare, vintage, or unusual civilian aircraft such as the Rutan Long EZ, HU-16 Flying Boat, Boeing Stearman biplane, Boeing B-25 or even a Mig-15.

Collecting the right data

Any flight tester will tell you it's all about collecting the right data in the correct amount to answer all the probing questions. Within the technical support division, Mr. Dan Carroll, an expe-

rienced instrumentation design and aircraft modification engineer, works daily to equip a wide variety of aircraft for the purpose of collecting data in flight.

In addition to periodic checks, repairs and upgrades on the school's fleet, he designs and helps install sensors and recorders on borrowed aircraft such as the T-37.

A recent test management project conducted by students investigated an undocumented spin entry characteristic on the venerable T-37 aircraft commonly known as the "Tweet."

Using the data acquisition system package designed and installed by Mr. Carroll, students were able to determine the new spin entry was not a safety of flight issue for undergraduate flight training students in the field. This type of real world result is a cornerstone of the training provided to engineers at the school.

Maj. Kelly Greene is a recent addition to the staff, overseeing the cutting edge flight research being conducted where flight research with international partners in addition to academia is emphasized. One of these research projects includes a joint venture with the German Flight Test Center on developing a novel methodology for measuring lift and drag characteristics without needing an engine thrust model.

Organizing the training

The school's mission is to produce highly trained test pilots, flight test navigators and flight test engineers to conduct and manage ground and flight test evaluations of research prototype and production aerospace vehicles and their systems. Around Edwards you'll often hear the school referred to as the "MIT of applied aeronautical engineering."

To accomplish this highly technical mission, the school is organized into five major divisions: operations, student training, plans and programs, curriculum standards and technical support.

Within the student training division, academic and flying instruction is broken out into four phases or branches: performance, flying qualities, systems and test management. In the performance, flying qualities, and system branches, students learn the academic theory and flight test. In test management, students put it all together by applying what they have learned by planning, conducting and reporting on a real world test project using the Air Force Flight Test Center approach to project management while under supervision of the staff.

Civilian master instructors

During recent years, senior school leadership observed a need to improve instructional continuity from year to year, and to raise the level of academic rigor at the school.

One of the initiatives implemented by management was to create three civilian "master instructor" positions, one for each of the three core academic branches in the student training division: performance, flying qualities and systems.

The master instructor's role is as technical expert for the branch. They are responsible for ensuring the level of academic rigor stays on the cutting edge of technology and to provide the long-term academic continuity with continuous curriculum improvement.

No one recognizes the necessity to plan for future training needs more than the instructors here. Recent technological advances in integrated systems of systems, uninhabited air vehicles, directed energy weapons, data link communications and space assets are increasingly becoming a driving force behind



As part of the Test Pilot School qualitative evaluation program, student flight test engineers get the unique experience of flying in a wide variety of diverse aircraft. Maj. Kelly Greene is shown here flying a modified B-25 World War II Vintage aircraft. (AFFTC photos)

the training needed for future flight testers. The instructor flight test engineers are stepping up to these challenges with new courses and curriculum events.

One of the most important new courses added to the systems phase is the data link course. Because of the recent extensive use of data links in modern military systems, it became important to teach students the academic theory behind how these links work, as well as the specifics on how to test them.

New course

Mr. Tom Nickles, an instructor in the systems branch and a flight test engineer, recently developed and taught the first data link course to students. This course, along with other courses being developed by the systems branch such as directed energy weapons, unmanned vehicles and systems, electronic combat and smart weapons, are providing the kind of advanced technology training required by the flight testers this century.

While the early years at Edwards were considered by many to be the "golden age of flight test," those with a clear vision of the future realize that the 21st century promises to be even more exciting. Programs such as the Joint Strike Fighter, hypersonic flight, single stage to orbit and Airborne Laser all promise many new challenges and rewards to those privileged to work in the flight test community.

The instructors here are dedicated to make sure all students who pass through the portals of the school to get the right training to equip them for their flight test jobs. Whatever new aircraft and systems 21st century technology may produce, the flight test engineers here will be a vital part of the team that trains and prepares test pilots, flight test engineers and flight test navigators to meet the demands placed on them when they graduate.

After all, flight testing really is a team sport.

— Mr. John Minor, USAF Test Pilot School

AEDC delivers "Right Stuff" to war fighters everywhere

Like a body builder who has sculpted himself to perfection, Arnold Engineering Development Center at Arnold Air Force Base, Tenn., in alliance with Pratt & Whitney helps sculpt America's war fighters by providing test before flight.

The allies deliver "the right stuff" to the F-22, the Air Force's newest air dominance fighter; and the two Joint Strike Fighter demonstrators, Boeing's X-32 and Lockheed Martin's X-35, through the continuing test program of the war fighters' power plant, the F119 engine. This "muscle inside the machines" undergoes stringent testing inside the altitude and sea level engine test cells here.

"Engine controls have advanced from hydromechanical units to digital electronic and full authority digital electronic control systems," said Mr. Hugh Horrocks, Pratt & Whitney AEDC site manager and development engineer.

"Late model Pratt & Whitney power plants for later model aircraft include the F100-PW-220 engine that powers the Air Force's Thunderbirds' F-16 Fighting Falcon aerial demonstration team, and the F100-PW-229 that powers the F-15E Strike Eagle and some F-16 C/D aircraft," he said.

Replacement options

As F100 engines continued to mature, Mr. Horrocks said the Air Force sought replacement options for aging F-16 and F-15 aircraft and commissioned Pratt & Whitney to develop a follow-on, high-technology engine for the F-22 Raptor. This engine became the F119 and its derivatives for the X-32 and X-35 JSF demonstrators.

Testing for these engines hit an all-time high in 2000 when six Pratt & Whitney military engines entered the test cells at the same time. On site were two F119 engines for the Raptor; two F100 engines; one F100-PW-220 and one F100-PW-229, as well as both versions of the JSF119 engine. One JSF119 was for the X-32 and the other, the X-35.

This past May, the Raptor's F119 achieved 4,330 total accumulated cycles toward the initial service release accelerated mission test.

"This was a significant test, representing six to eight years of normal use of the F119 engine," said Brig. Gen. Jay Jabour, F-22 System program director at Wright-Patterson AFB, Ohio. "This demonstration gives us significant confidence in the durability of the engine."

After testing in the center's aeropropulsion systems test facility, the F119 was installed into AEDC's Sea Level Test Facility



The Pratt & Whitney F119 engine operating in a test cell at Arnold Engineering and Development Center, Arnold Air Force Base, Tenn. (Photo by Mr. Gregory Roberts, courtesy of Pratt & Whitney)

where operators repeated simulated in-flight mission cycles the aircraft would experience while flying a six-to eight-year life cycle.

"It is imperative to do this type of testing to give the Air Force and the manufacturer advance visibility of the engine's performance and durability," said Mr. Marcos More, project manager for Sverdrup Technology, Inc., AEDC group. "We are helping our customer see how durable his product will be over life expectancy."

'The Right Stuff' begins here

Behind the scenes before critical engine testing begins, workers play a vital role in ensuring a successful test. Electricians, pipefitters, machinists, ironworkers and numerous other workers make sure the engine is installed correctly and all operational lines and systems work properly.

Mr. Lamont Snipes, pipefitter leadman, is a 31-year veteran of the center, building integrated piping systems for water, fuel, steam and gaseous nitrogen used to operate the many valves and components of the engine system.

"My job helps protect the test article as well as allowing the system to operate in a manner that the test as a whole will provide the best data and information at the best price with quality workmanship," he said.

Taking pride in their work

"Engine testing reduces the risks and costs associated with flight-testing, helping prepare for the known and unknown conditions our pilots face," he said.

"Without the work conducted here, critical defense systems would incur higher risk and costs during the flight test. We provide information from ground tests that allows the customer to make modifications to their product without the risk of losing that equipment during a flight test.

We take pride in what we do," he said. "The work conducted here is important to maintaining and safeguarding our country and families. It is vital that the United States remain the leader in air superiority."

In addition to testing the F119, Arnold has provided additional support for the F-22 and JSF programs. Thousands of hours of wind tunnel testing have been performed on the Raptor including store separations testing in the propulsion wind tunnel.

— Ms. Dana Davis, AEDC Public Affairs



NASA's B-52B, tail number 008 (left), sits nose-to-nose with its eventual replacement, a B-52H (Photo by Mr. John Haire, AFFTC Public Affairs)

AEDC delivers

The Air Force Flight Test Center, Edwards Air Force Base, Calif., highlighted its partnership with NASA August 1, when center leadership officially handed over an "H" model B-52 Stratofortress to NASA during a ceremony at the NASA Dryden Flight Research Center.

A crew from the 23rd Bomb Squadron at Minot AFB, N.D., delivered the aircraft to Edwards July 30, for pre-depot inspection. The aircraft will replace NASA's B-52B "008," in the 2003-2004 timeframe. It will take about one year for the B-52H to be ready for flight research duties. This time includes programmed depot maintenance, construction of the new pylon, installation of the flight research instrumentation equipment, and aircraft envelope clearance flights.

Making the transition a reality

Lt. Col. Don Thompson, director of the center's Access to Space Office, and his team worked alongside NASA experts to make the transition a reality.

"We want to continue to partner with NASA in an effort to find cost-effective and reliable ways of getting to and from space," Col. Thompson said. "The Air Force needs to have rapid response capability into space at any time. Loaning NASA researchers this aircraft and continuing to support them in the future will help the Air Force meet this goal."

The B-52 will serve as an air-launch aircraft and is expected to boost both NASA and Air Force efforts in researching and

demonstrating technologies for future access to space vehicles.

"Most aerospace vehicles require some kind of captive carry to expose them to the actual flight environment and then to bring it back from that environment," he said. "In the meantime, the B-52 provides a support service for the space vehicle in terms of power and instrumentation to monitor the vehicle while it is exposed to the space environment."

A platform for the future

AFFTC, Dryden and the Air Force Research Laboratory have an alliance that serves as a trilateral, cooperative relationship to improve service and lower cost to the internal and external customers of each.

"We have been seeking a replacement aircraft for our existing B-52B-model for some time — it is great to see the H-model finally arrive," said Dryden Center Director Mr. Kevin Petersen. "It should provide us an excellent launch platform for the future."

The Office of the Secretary of Defense and the Air Force are partially funding, along with NASA, a flight research instrumentation package installed on the aircraft, as well as other modifications. The B-52H left Dryden August 2, for de-militarization and programmed depot maintenance at Tinker Air Force Base, Okla. The maintenance is scheduled to last about six months and the aircraft will be returned to Dryden upon completion.

— Ms. Leigh Anne Bierstine, AFFTC Public Affairs

F100 testing provides insight to future fighter performance

The Arnold Engineering Development Center's Sea Level Test Stands at Arnold Air Force Base, Tenn., are providing technical and logistic insight for the F-15 and F-16 fighter jet engine performance, durability and reliability.

The AEDC, Pratt & Whitney and Sverdrup test team has completed the final test of an F100-PW-229 engine. During the 12-month program, the engine performed 3,503 sea level accelerated mission tests and 988 increase in pressure in forward facing tube as a result

of vehicle speed through atmosphere accelerated mission test cycles. The program also included high-cycle fatigue testing to further validate engine hardware integrity.

"The robust accelerated tests have validated several improvements that will significantly benefit those who fly and maintain F100 powered F-15s and F-16s," said Mr. Bill Hunt component improvement program lead.

The engine is an augmented, twin-spool, axial-flow, turbofan engine with a high compressor pressure ratio of 8.6 and

fan pressure ratio of 3.8 for sea level static standard day conditions.

After AEDC test completion, the engine will be shipped to Pratt & Whitney test facilities in East Hartford, Conn., for high-cycle fatigue testing.

From there, the engine will go to the company's Middletown, Conn. facility for full engine teardown and analytical condition inspection that provides a rigorous evaluation of all hardware for damage or wear resulting from the robust test.

— Ms. Tina Barton, AEDC Public Affairs

Aerial tour enhances teamwork of wings

Having recently arrived at Edwards Air Force Base, Calif., newly in charge of the 95th Air Base Wing, Col. Cheryl Zadlo, 95th Air Base Wing commander, was given a tour of the base's airspace.

Strapped into the back seat of a T-38 with Col. Steven Cameron, 412th Test Wing commander at the controls, Col. Zadlo was given a full orientation. The flight concluded with a simulated space shuttle approach and a lakebed landing, two things that are never done anywhere else, according to Col. Cameron.

Understanding team roles

"I offered this flight opportunity to Col. Zadlo because teams always operate better when all the players understand the other members' roles," Col. Cameron said.

"Since this is Col. Zadlo's first exposure to the flight test environment, I hoped to give her a better understanding of the test wing mission and people, as well as to give her a better feeling for the huge flying complex that supports the flight test center's operation.

Col. Zadlo jumped at the chance to witness a key activity of the test wing. "So I could quickly learn its flight opera-

tions and programs and areas where, in their eyes, the air base wing provides crucial support," she said.

Providing quality of life

"If the 95th Air Base wing didn't deliver a quality of life that makes Edwards a great place to live and work, then how can the test wing provide quality research, development, test and evaluation?"

"From housing to services to maintaining the base runways, the air base wing is the foundation from which Air Force Flight Test Center's test execution, conducted by the test wing, starts," said Col. Cameron. "The air base wing is essentially the life support system that makes the test wing viable. We are two tightly interconnected, inseparable cogs in the flight test center machine."

One recent example of air base wing support of the test wing, and the AFFTC mission is the 95th Civil Engineer Group's response to the power outage at the air traffic control facility here.

"Until the civil engineering folks had power back up to the building, we had to restrict the number of flight test missions airborne in our restricted areas," he said. "They were able to get us back up and running with fairly minimal impact."

Although the mission of air base wings across the Air Force is basically the same — to support the flying mission of the base — the nature of flight testing and the mission of the 412th Test Wing make the mission of the 95th unique.

"The fighter, bomb and mobility wings I've supported in my different assignments did not have the array of aircraft at one installation at one time," Col. Zadlo said. "Along with these and other diversified test vehicles comes more integrated and complex support requirements. That's where teamwork is essential."

Partnership is the key

Both commanders stress teamwork and the partnership between the two wings. "I look forward to working with Col. Cameron, and working with our two wings together at all levels," Col. Zadlo said. "During this sortie alone, I met or saw the end result of active duty, reservists, civilians, contractors and family members from both wings, as well as associate units. What an impressive group of professionals — with passion! If that doesn't light your fire, your wood must be wet."

— Tech. Sgt. Christopher Ball, AFFTC Public Affairs



Col. Steve Cameron, 412th Test Wing commander, gives last-minute instructions to Col. Cheryl Zadlo, 95th Air Base Wing commander, prior to her orientation flight in a T-38 Talon. (Photo by Tech. Sgt. Christopher Ball, AFFTC)



Photo by Maj. Sean Frisbee

"General'ly" Speaking

INDIANAPOLIS, Ind. — Gen. Lester Lyles, commander of Air Force Materiel Command, wishes Mr. Elliott Sadler good luck at the start of the Brickyard 400 NASCAR race Aug. 5 at the Indianapolis Motor Speedway.

Mr. Sadler drives Car No. 21, which the Air Force helps sponsor. Gen. Lyles represented the Air Force at the race and also talked with media representatives about the service's recruiting and marketing efforts.

— Information provided by AFMC Public Affairs

AEDC celebrates 50th anniversary with air show

ARNOLD AIR FORCE BASE, Tenn. — Arnold Engineering Development Center recently celebrated 50 years of aerospace testing with an air show at nearby Tullahoma Regional Airport and a dedication ceremony.

The air show featured the Thunderbirds, Army Golden Knights parachute team and the Navy's newest fighter, the F/A-18 E/F Super Hornet along with several other aerial demonstrations.

Static displays included vintage World War II Army Air Forces aircraft known as War Birds, U.S. Army Apache, Chinook, Kiowa Warrior and Black Hawk helicopters, tanks and armored personnel carriers, a Patriot Missile Battery from Redstone Arsenal in Huntsville, Ala., and the Reactor, a motion theater featuring the U.S. Navy's Blue Angels.

Arnold is the nation's largest complex of flight simulation test facilities. President Harry Truman dedicated the center in June 1951. It's named after General of the Army and later Five-Star General of the Air Force Henry Harley 'Hap' Arnold, visionary leader of the Army Air Forces in World War II and the only airman to hold 5-Star rank.

Today, AEDC has 58 aerospace test facilities located here, and at a remote operating location Hypervelocity Tunnel 9 in White Oak, Md. The test facilities simulate flight from subsonic to hypersonic speeds at altitudes from sea level to space.

Virtually every high performance aircraft, missile and spacecraft in use by the Defense Department today and all NASA manned spacecraft have been tested in Arnold's facilities.

— Information provided by AEDC Public Affairs

Tinker air base wing gets new commander

TINKER AIR FORCE BASE, Okla. — Col. Dennis M. Kaan assumed command of the 72nd Air Base Wing during a July 9 ceremony. He came to Tinker from Charleston AFB, S.C., where he was commander of the 437th Support Group, 437th Airlift Wing.

Despite soaring temperatures, hundreds turned out for the change of command ceremony. Outgoing commander, Col. Robert Gambrell and his wife, Sheila, head to Alabama where he will be commander, Detachment 010, Air Force Reserve Officer Training Corps, University of Alabama.

He will be responsible for the development and commissioning of future Air Force leaders.

— Information provided by OC-ALC Public Affairs

T-6D "Mosquito" and radio jeep at USAF Museum

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The U.S. Air Force Museum added another piece of history recently when the North American T-6D "Mosquito" and Tactical Air Control Party Jeep went on display, broadening the Museum collection of more than 300 display aircraft and missiles.

Originally known as the Texan, the T-6 was the sole single-engine advanced train-

er for the U.S. Army Air Forces during World War II.

The T-6D "Mosquito" on display flew as an early Mosquito with the 6147th Tactical Air Control Group during the first two years of the Korean War. It was converted to a mosquito-spraying aircraft in 1952, and two years later transferred to the Republic of Korea Air Force.

After retiring the aircraft, Korea placed it on display outside for several years. The U.S. Air Force Museum acquired it for restoration in 1995. Museum staff finished restoring the aircraft in June 2001.

In addition to the Mosquito, a Tactical Air Control Party Radio Jeep is part of the exhibit.

Mosquito Association members restored, fitted with radio equipment and donated the Jeep on display to the U.S. Air Force Museum in 2001.

The jeep's original mission was to directly control air strikes at the front line, but they developed a new and important mission as the Korean War progressed and became communication links between ground commanders, airborne Mosquito forward air controllers and strike aircraft.

— Information provided by USAF Museum Public Affairs

Defense Department official visits Robins

ROBINS AIR FORCE BASE, Ga. — Mr. Edward Aldridge, under secretary of defense for acquisition, technology and logistics for the, visited here recently.

Mr. Aldridge is responsible for all matters relating to the Department of Defense acquisition, research and development, logistics, advanced technology, international programs, environmental security, nuclear, chemical and biological programs and the industrial base.

In his comments to community leaders and the media after his tour, Mr. Aldridge commended the work being done at Warner-Robins Air Logistics Center both for the country and in support of the war fighter.

Mr. Aldridge, who served as Air Force secretary from 1986 to 1988, also said he plans to deliver a strategic plan for depot maintenance to Congress by the end of the year. His report should be complete in August, he said.

— Information provided by WR-ALC Public Affairs

Tinker unit goes lean for savings

The first lean cell back shop has been set up in the blade repair facility at Tinker Air Force Base, Okla. This is the only facility in the Air Force repairing the F110-400 first-stage low-pressure turbine nozzles.

These critical aircraft components used to travel more than nine miles, or 48,000 feet, during their maintenance journey at Tinker. With the advent of the lean cell, the travel time has been reduced to about 8,000 feet or 1.5 miles.

It flows

The lean cell went through Kaizen planning, which looked at the flow process of this part and planned a better one. Previously, three sections were involved in the repair of the nozzles and now there's just one with a reduction of flow days by at least 35 to 40 days from the original 200.

"This project was identified early in 1999 as a solution to reducing the excessive flow time required in the repair of the nozzles and represents the first Air Force application of a lean production product line in the repair environment," said Mr. James Holley, chief, blade repair section. "The concept behind this system is to minimize part handling, reduce part transportation and eliminate many of the tasks that do not add value to the part."

Lean and mean

Part of the concept used to accomplish this objective was to locate all the necessary machine tools and processes necessary to perform this repair in close proximity. This minimizes the part's travels, creates a single part flow, minimizes inventory, accommodates visual controls, establishes part accountability in a centralized area and allows for

the implementation of other time-saving techniques.

"The nozzles were identified by customers as a 'bottle-neck' part because of the lengthy repair times experienced at Tinker," said Mr. Holley.

Cutting time in half

"At one point, a number of aircraft were grounded through lack of engines because of the long lead time necessary for engine parts," he said. "The new work cell reduces flow time by more than 50 percent."

Equipment was moved from its previous location and placed to form a natural part flow through the repair process. Other equipment has been purchased or refurbished.

"Equipment requirements were based on a study of the projected workload over the next 10 years and placed in a 5,000-square foot space previously used for storing blade baskets and inventory," said Mr. Holley.

"By eliminating some of the unused inventory and providing upgrades to the material handling system, the storage requirements were moved to other areas without reducing the existing production capacity of the building," he said.

The nozzle is crucial to the aircraft engine, said Mr. Holley. "The fuels that ignite and fuel the engine are distributed through these nozzles. Without these parts, the aircraft doesn't fly. That's why it was vital that we develop a faster repair time process."

Saving money

According to Mr. Holley, if the time and travel savings were converted to dollar savings, it would probably be about \$6,000 per nozzle. "A new nozzle costs more than \$150,000 each and we repair



Mr. Terry Rogers, a machinist in the nozzle shop of the blade repair facility at Tinker Air Force Base, Okla., checks the progress of an F110-400 low pressure turbine nozzle segment in an electrical discharge machine. (Photo by Ms. Margo Wright, OC-ALC Public Affairs)

them for about \$30,000 each. That's a significant savings and when you add the lean cell savings, it becomes phenomenal."

A cooperative effort

The ideas for the lean cell began through a cooperative effort of the Engineering and Planning Branch, Propulsion Management Directorate and General Atomics, an on-base subcontractor.

Funding was provided through ManTech Directorate, Wright-Patterson Air Force Base, Ohio, and is part of a

larger program to advance manufacturing technology at Tinker. This manufacturing advancement is already being explored through future workloads such as the F100 workload.

"We are already working up a prototype for this part," said Mr. Holley. "At the same time, we're looking at several other workloads that are currently on contract to see if we can bring them back in and work them at a better cost."

— Ms. Gail Kulhavy, OC-ALC Public Affairs

"Star Wars" equipment moves south

Cryogenic chamber gets new home and new life with NASA

A multi-million-dollar cryogenic chamber, erected as part of Air Force research for President Reagan's Strategic Defense Initiative of the 1980s, will be given new life enhancing NASA space science capabilities for the 21st century.

A crane recently lifted the main, two-story tank from an annex of the Air Force Research Laboratory Information Directorate in Rome, N.Y.

The tank, as well as mounts and controls, are being trucked to NASA's Marshall Space Flight Center in Huntsville, Ala.

Simulating space

Opened June 1989 as the "Cryogenic Test Facility" at the then Rome Air Development Center, the chamber was built to test prototype space systems and components in pressures and temperatures simulating space environments, and was funded through the Strategic Defense Initiative Office at a time when testing was projected for large optical components of a space-based surveillance system.

Pressure in the chamber can be lowered to near vacuum conditions and the facility was designed to drop temperatures to 100 degrees Kelvin – or 279 degrees below zero on the Fahrenheit scale. It can accommodate test articles up to six feet in size.

Optical observations

"The cryo chamber was used for more than just testing objects in extreme cold," said Mr. James Cusack, an engineer on the program at the time and now chief of the Information Directorate's Information Systems Division. "It also served as an optical test chamber."

"Our original mission was to test optics envisioned for a space-based ballistic missile defense system," said Mr. Cusack.

"With this chamber, engineers would look down at the mirror being tested from above and conduct experiments with classic optical test equipment. Based on chamber observations, the surface of mirrors could be altered to eliminate minute, atomic-level variations caused by the simulated space environment."



A crane lifts the main tank of a cryogenic chamber from AFRL's Space Simulation Facility at Griffiss Business & Technology Park in preparation for a move to NASA's Marshall Space Flight Center in Huntsville, Ala. (AFRL photo)

Moving on

With the demise of strategic defense initiative space optics work at Rome, the chamber was renamed the Space Simulation Facility and was used sporadically under a 1994 memorandum of understanding with NASA's Goddard Space Flight Center.

It will now become the largest vertical cryogenic chamber at NASA's Marshall complex. The move will cost approximately \$300,000 and provide space scientists and engineers with a capability estimated to cost between \$6 million and \$10 million if constructed new.

— Mr. Francis Crumb, AFRL Public Affairs

Learning lean

Program gives students on-the-job training

A cooperative education program with area technical colleges is helping Robins Air Force Base, Ga., maintain a highly skilled technical labor force. The co-op program allows students to gain experience and learn new processes needed to become part of the technical workforce.

One of these new processes is lean repair, a project currently in place to apply lean thinking to maintenance, repair and overhaul. The objective of the project is to reduce cycle time, improve schedule performance and reduce depot and base work-in-process inventories.

Co-op requirements

To be considered for the program, students must be enrolled for at least six months at a participating technical school in the sheet metal, aircraft machinist or electrical skills program and be recommended by an instructor.

Mr. Don Slee, Middle Georgia Technical College co-op representative, said a student being accepted into the program must complete their first six months at school having maintained a "B" average and have received an "A" in work ethics.

Although this is the start, Mr. Slee said it still does not guarantee the student will be accepted into the program. Next, the student must go through a base interview process, which includes a background check. "If the interview goes well, and the background check doesn't reveal anything, then the student is able to go into the first work cycle," he said.

After the student completes the base requirements, they become full-time employees. The student then works 40 hours per week for six months, after which they return to school. For the next six months they are a full-time student.

"In this program work is work and school is school," said Mr. Slee. "There is no mixing of the two."

After their six months at school they return to the base where they continue hands-on training for another six months. Mr. Slee said after the third work cycle, depending on their supervisor's recommendation and their work performance, the students are then placed on a probationary period of full-time employee status after graduation.

Real world experience

Mr. Slee said this program offers the students more than just book knowledge, it provides much-needed experience. "Real-world experience is more important for your resume than any other," he said. "You can graduate with 18 months of school and not get hired at a job; people need hands-on experience."

There are currently 200 students in the program. Thirty-five others have completed the program, and are now full-time employees of Robins.

Each of the participating schools has a representative, like Mr. Slee, who serves as a mediator between the school and the base.

Students like Ms. Christina Jackson know how the process works. Beginning her first work cycle in January, she said she learns something new every day.

"Because this is a training program, I get to learn as much as I want," she said. "It never gets boring."

For Ms. Jackson, the first few months have involved a lot of



Ms. Christina Jackson is a student working and learning through the Robins Air Force Base, Ga., co-op program. She is working in the F-15 radar repair branch during the first rotation of her two-year electronic technology co-operative education program. (Photo by Ms. Sue Sapp, WR-ALC Public Affairs)

on-the-job training. "I am basically learning how the job is run by being involved with all of the different facets." In the first rotation of her two-year electronic technology co-op, she works in the F-15 radar area where she is learning to work on the different units of the F-15.

Some of our best employees

"Co-op students are a real benefit to us," said Mr. Tim Harwell, an electronics systems technician. "They are usually some of our best workers." Mr. Harwell said within a few weeks the students have learned so much and, within a few months, are able to work on their own more than half of the time.

Like most co-op students, Ms. Jackson came in with little other than classroom experience. Each student is provided a trainer who teaches how each of the units operates and stands by in case additional help is needed.

Students like Ms. Jackson are helping to prepare the center for the predicted retirement of 60 percent of its workers in the next five years. "These students are the people who will institutionalize lean and help improve depot competitiveness," said Mr. Don Jarzynka, deputy production chief C-130. "They are learning the processes that will do away with many meaningless tasks."

Mr. Jarzynka said that the co-op program is getting the center back to where it was 10 years ago. "We are able to reach the top percent of technical school classes," he said. "Last quarter our co-op students ranged from grade point averages of 3.4 to 4.0."

Technical colleges involved in this endeavor include Middle Georgia, Warner Robins; South Georgia, Americus; Flint River, Thomaston; Central Georgia, Macon; Georgia Aviation in Eastman; Swainsboro Vocational, Swainsboro; Heart of Georgia, Dublin; and Alabama Aviation, Ozark, Ala.

— Ms. Lanorris Askew, WR-ALC Public Affairs



Left: An American flag which flew over the grave of Lt. George Kelly, the first military pilot killed in a crash of a military aircraft, was lowered for the final time at the Kelly Air Force Base, Texas, closure ceremony July 13. As the flag was folded, the roar of 75 mm Howitzer cannons echoed across the base in a 21-gun salute honoring the men and women who have worked at the base during its many years of service. The base will now be known as Kelly USA. (Air Force photo by Staff Sgt. Jeffory Mulcahy) Top right: Gen. Lester Lyles addresses an estimated 4,000 well-wishers and former employees attending the “Final Salute” ceremony at McClellan AFB, Calif., April 10. The base will now be known as McClellan Park. (Air Force photo by Ms. Libby VanHook, AFMC Public Affairs) Bottom right: Following the ceremony at McClellan there was a fly-by of several vintage aircraft with a tie to McClellan over the years. (Courtesy photo)

AFMC bids bittersweet farewell

Air Force Materiel Command bid a final farewell to two of its most respected members July 13 when Kelly Air Force Base, Texas, and McClellan AFB, Calif., closed their doors forever. The Base Closure and Realignment Commission recommended closure of these two installations in 1995, allowing six years to fully accomplish these closures.

The installations followed differing paths towards closure. McClellan is a total closure, while Kelly closed the Air Logistics Center and realigned about half of the base property under Lackland AFB, Texas.

This past April, following 63 years of service to this country, McClellan hosted a “Final Salute Ceremony” attended by more than 4,000 well wishers and former employees before the majority of their work force moved on. Consequently, there were only about 300 people attending a final ceremony to watch the nation’s colors slowly lowered for the last time.

In the nearly six years since McClellan was identified for closure, more than 25 private businesses now call McClellan home and Sacramento County planners estimate that as many as 34,000 jobs could one day reside at the new McClellan Park, according to Mr. Jim Barone, former Sacramento Air Logistics Center director, and now AFMC’s director of personnel.

More than 2,500 people attended a closing ceremony at Kelly July 13, followed by a “Kelly Forever” dinner held at the Henry B. Gonzalez Convention Center.

Kelly was originally established as a grass air strip in November 1916 and until its closure boasted the Air Force’s oldest continuously active airfield.

The base will now be known as Kelly USA where the redevelopment story is also encouraging — almost 30 companies and 5,500 new jobs. The two major companies located there are Boeing and Lockheed-Martin.

— Ms. Libby VanHook, *Leading Edge* executive editor



Brothers achieve "mountain high"

In a sport where nature calls the plays, and only 50 percent succeed, the feeling of victory is indescribable. Second Lt. Michael Anderson, Hill Air Force Base, Utah, knows the feeling. He successfully embodied the courage, strength, stamina and thrill to reach North America's highest peak, Mount McKinley, Alaska.

"It really doesn't set in at the time," Lt. Anderson said. "You're thinking of immediate things like getting down and getting warm. But, this is a climb we've been dreaming of doing for probably three years so we felt real fortunate to have good weather and were able to do it."

The idea to climb the mountain sometimes called Denali, a Native American word for "The High One," was his twin brother's, 2nd Lt. Mark Anderson, who is stationed at Kirtland AFB, N.M. "He dragged me along," Lt. Anderson said. "It was his idea of a big challenge."

Getting ready

To prepare for the 20,320-foot steep, icy climb, Lt. Anderson trained six months by hiking, back-country skiing and skiing up in which "you put these things on, like an animal skin where the fur runs in one direction, it glides up hill, but you don't fall back," he said.

On May 14, the Anderson brothers, along with Mr. Marc Springer, a climbing partner from Layton, and 420 pounds of equipment, left Salt Lake City for Anchorage on a three-week journey to test their physical and mental endurance.

Mount McKinley high

Arriving at the glacier's base camp by way of a Cessna 185 equipped with skis, the expedition began the process of acclimating to McKinley's high altitude. Base camp is at 14,000 feet.

"Our plan was to climb up West Buttress, which is the easiest route, to acclimatize and get our bodies ready," Lt. Anderson said.

The two would then climb a more difficult route, Cassin Ridge, to reach the summit.

"You're often looking for the purest line — the steepest. Cassin is a straight ridge that goes up the mountain. Other people take West Buttress, which just winds around avoiding difficult sections. It's not as steep."

They spent days ascending and descending the West Buttress. "The key to acclimation is climb high and sleep low," he said. "During the day you want to get as high as you can and then get down. The lower you are, the faster your body will recover from

the altitude," Lt. Anderson said.

Mother Nature wasn't always nice

Just when they felt acclimatized and were physically and mentally ready to go, nature threw a curve in the plan. The weather turned bad and the three were stuck in a tent for five days.

"It was frustrating and boring," he said. "It was about 20 degrees — a lot of sustained cold weather — and that's one of the hardest things mentally. That was probably when we had the most doubts about not reaching the summit. It was really tempting just to go home because we didn't know how long the bad weather would last, and we only had so much time."

The threesome received a weather report every night from the National Park Service rangers. "I think it's more entertainment than anything else," Lt. Anderson said. "They try their best at predicting the weather, but it's so unpredictable up there. The mountain creates its own weather. It was never what they said it would be so we went on our own intuition."

The main event

Eventually, the weather changed and the three headed to Cassin Ridge carrying 30-pound packs and hauling a sled that carried two stoves and fuel to melt snow for water, four days of freeze dried food, a light-weight tent, sleeping bags and extreme cold-weather gear.

"We started about noon because it was so cold, he said. "You wait for the sun to hit you and warm things up. You can climb till basically 10 p.m. The sun goes behind the mountain for about six to eight hours, but, it's always light."

They ascended 16,000 feet in knee-high snow and descended to 13,000 to pick up the Cassin Ridge route at 11,000 feet.

Descending they experienced firsthand one of the dangers of climbing a glacier — Mark fell through a crevasse.

"He took a pretty big fall," Lt. Anderson said. "That was pretty exciting. It looked solid and held me — I walked right across it. And then Mark went across and fell right through. We were all roped up so I was able to pull him out."

They ascended to 13,000 feet on the Cassin Ridge the second day and set up camp.

"Right when we got there the sun went behind the mountain and it got cold pretty quickly," he said. "I would guess it was 15 below. But, there's still a lot of work setting up camp and melting water."

According to Lt. Anderson, staying hydrated is the best way

to avoid altitude sickness, so melting water was a top priority. They tried to drink two quarts of water every four hours, and every time they ran out they had to stop, bring out the stoves and fuel and melt snow.

Whoever was motivated did the cooking. They ate a variety of chicken and rice dishes that they added water to and heated.

Continuing to fight the cold, dangers of icefalls, avalanches and mental fatigue, they reached the summit at the end of the third day. The weather was gorgeous even though it was 30 degrees below zero, he said.

Psychologically challenging

"I was relieved to reach the summit," Anderson said. "But still, it was 8:30 p.m. and we knew it would get cold real soon so you're in a hurry to get down. A lot of people think that once they get to the top the climb is over, but it's not. You have to stay focused, concentrate and not make stupid mistakes. It's a psychological thing.

"The hardest part is just staying motivated," he added. "You're really exhausted, the altitude is getting to you, you're thirsty, you're hungry, you're sleepy and you try not to screw up. You have to be careful."

More accidents happen on the descend route at a point called Denali Pass than anywhere else on the mountain, said Lt. Anderson.

"There's a pretty good trail, but if you slip you are going to fall probably 1,000 feet down this ice slope into some crevasses. So that was one place we knew we needed to be really cautious.

They descended to 17,000 feet, camped, and made it back to base camp the next day.

The first thing Lt. Anderson did when he got back was take a shower and eat lots of food.

"I lost 15 pounds," he said. "I ate for like a week straight, and probably gained the weight back in two weeks."

Would he do it again?

It will be long time before he tries Mount McKinley again.

"It was a good route, I liked it, and it was worthwhile once," Lt. Anderson said. "But, because of the altitude it takes a lot of time. I'm pretty fortunate to be in a position to get the time off work — the military is flexible, but if I spent three weeks somewhere else I could get five or six climbs in..

According to Lt. Anderson, the cost to make such a climb can add up. The National Park Service charges \$150 for a climbing permit. Traveling expenses are about \$1,000. In addition, climbers need to purchase food and special cold-weather gear such as foam boots to go over plastic climbing boots, pants, shell and mittens, strong sunscreen and goggles.

Growing up in Oregon, Lt. Anderson started backpacking and hiking with the Boy Scouts. He continued the sport and became an avid climber while attending the Air Force Academy in Colorado Springs, Colo. Hill is his first assignment since receiving a commission two years ago.

Lt. Anderson also gained climbing experience in Colorado, Grand Tetons, Provo Canyon, Ben Lomond Peak, and Malan Falls in Ogden. He's climbed in Mexico and completed a lower glacier climb on Mooses Tooth at Ruth Gorge, Alaska.

For his next adventure, Lt. Anderson hopes to climb in the Canadian Rockies.

— Ms. Sue Berk, OO-ALC Public Affairs



A Cessna equipped with skis delivered the climbers and their equipment to base camp. The camp provided them the opportunity to acclimate to McKinley's high altitude. (Courtesy photos)



2nd Lt. Michael Anderson, Hill Air Force Base, Utah, melts snow for drinking water during their journey. Staying hydrated prevents altitude sickness, so the expedition aimed to drink two quarts of water every four hours.



2nd Lt. Mark Anderson, Kirtland AFB, N.M., climbing through the "first rockband" on the second day at about 15,500 feet.

Title photo on previous page shows Lt. Michael Anderson leading some steep ice climbing on the first day of the climb at about 13,000 feet.

"Globetrotter" takes on USAF Marathon

To call Dr. Rex Wilson a "globetrotter" is a misnomer.

Preferring running to trotting, this 311th Human Systems Program Office athlete from Brooks Air Force Base, Texas, has competed in marathons throughout the globe.

Now he has set his sights on Wright-Patterson AFB, Ohio, to compete in his first Air Force Marathon and 124th marathon in his career.

The MITRE Corporation contractor made history in 1995 when he crossed the finish line in Antarctica, becoming the first person to have completed a marathon on all seven continents. Prior to this achievement, he was among the first North Americans to complete marathons in all 50 U.S. states and the District of Columbia.

He is also among the first runners in history to complete marathons in all the provinces and territories of Canada and Australia.

A slow start

What makes Dr. Wilson's accomplishments all the more amazing is that he began his marathon career as a 230-pound sedentary electrical engineer at age 45. Since then he has run in 123 marathons, including 19 ultra-marathons, in 15 countries.

"My motivation for running is to lose weight," said the 59-year-old Clarksburg, W. Va. native who admits having done nothing athletically in high school or college. After moving to Arlington, Va. in 1986, Dr. Wilson realized he was not happy with his physical condition.

Strategic plan

"There was a high school track across from my new home where I started running. In the first year, I lost 60 pounds," he said. Goal-oriented and possessing an engineer's proclivity for detail, he mapped out his running strategy.

"I started doing longer runs, limiting myself to a 10-minute pace. What I discovered was I had no trouble extending my pace on longer runs. It was an emotional experience for me. I realized I was able to go the extra distance," he said.

While the training regimen gave him confidence, he didn't consider running a marathon until he had fully prepared for one, albeit, in a quite unusual manner.

"I was too embarrassed to sign up for a marathon until I knew I could do it," he said.

The intensely private Dr. Wilson did not broadcast to anyone what he was doing when he ran 105 times around a high school track non-stop in 4 hours, 22.5 minutes. His "own" marathon completed, he finished his first official one at Jacksonville, Fla. in January 1987.



Dr. Rex Wilson from Brooks Air Force Base, Texas, is credited with being the first person to complete a marathon on all seven continents.

He had been persuaded to enter a marathon by friend and fellow West Virginian Mr. Jerry Herndon, who has 472 marathons to his credit. Dr. Wilson recalls exclaiming to fellow runners during his first marathon, "I don't know why I'm doing this, but I'm doing it."

Setting goals

Shortly thereafter, he continued running marathons. Dr. Wilson's running odyssey gained unexpected momentum

when he mirrored a fellow runner's goal of completing marathons in all 50 U.S. states and D.C.

In one year, he completed 31 marathons. More importantly, he slimmed down to 165 pounds.

On Nov. 12, 1989, he fulfilled his 50-state and D.C. goal when he completed the Louisville, Ky., marathon. By the mid-1990s he had completed marathons throughout Canada and Australia.

Setting records

While Dr. Wilson's achievements are not comparable to that of Mr. Norm Frank, the U.S. record-holder for career marathons with 744, or friend Mr. Wally Herman, who has run marathons in a record 93 countries and was the first person to run in all 50 states and D.C., this engineer has nonetheless left his mark on the sport. He is one of only about a dozen runners in the world to have completed marathons on every continent.

"My friend and I had talked about doing it for some time, but it was impossible because at the time there were no marathons in Antarctica," Dr. Wilson said.

By the time the first Antarctica athletic event in history was organized, they had logged marathons on six continents. Apprehensive about running in anticipated extreme conditions, Dr. Wilson's anxiety was fueled by the trip to Antarctica. "The worst thing that happened to me was I became sea sick on board ship. I said to myself, 'How am I going to run this marathon? I can't even eat'."

Of the 84 runners who participated, only four had completed marathons on six continents. Surprisingly, the weather was not severe, although Dr. Wilson had never before run on ice or snow. "I just ran slower," he said of negotiating the terrain that included running on a glacier. He completed the marathon, putting him in the record book.

Marathons for Dr. Wilson have been a continual weight management exercise. Serendipitous to this has been experiencing wonderful sights in his travels. He looks forward to competing at Wright-Patt, saying, "I understand the race is held entirely on base. That will be different for me."

— Mr. Rudy Purificato, 311th Human Systems Wing

Robins services wins 2001 Curtis A. LeMay Award

ROBINS AIR FORCE BASE, Ga. — Maj. Gen. Dennis G. Haines, Warner Robins Air Logistics Center commander, recently announced that Robins was named the 2001 Curtis A. LeMay award winner.

The 78th Services Division was named the winner after the division sealed the Air Force award with a grand display of patriotism and service when the five-member LeMay team visited Robins to evaluate services here.

The LeMay Award was established in 1965 by the Order of Daedalians Foundation as special recognition for excellence in programming and service. The award was named in honor of Gen. Curtis E. LeMay who had a life-long interest in support provided by Air Force Services personnel around the world. The award's purpose is to encourage excellence in services' programs Air Force-wide. Each major command may nominate one base for the Air Force-wide award.

The visiting team evaluates each nominee based on specific criteria defined in the awards' nomination criteria.

The LeMay award trophy was presented Aug. 23 during the worldwide conference at Wright-Patterson Air Force Base.

— *Information provided by WR-ALC Public Affairs*

Robins programs chief wins meritorious award

ROBINS AIR FORCE BASE, Ga. — Ms. Carolyn Stevens, family member programs flight chief, is the recipient of the Civilian Manager Services Individual Meritorious Award for the year 2001.

According to the nomination packet, she is a dynamic, energetic and results-oriented leader who leads a flight of 132 employees and 31 family childcare providers. She helps to produce the highest quality childcare, community center and youth programs.

Each year the Air Force recognizes excellence in 14 individual categories and 14 services programs through the annual services awards programs. These individual, program and flight awards recognize those individuals and programs demonstrating the best leadership, management

customer focus and operational results during the past year.

Ms. Stevens successfully guided both child development centers through the national accreditation process. Each facility's validation visit occurred within one week of each other, with one center receiving 100 percent compliance.

She is also credited with significantly improving childcare as a member of United Way's Regional Accreditation Project Team.

She has been at Robins for more than seven years and began her work here as director of the childcare center.

During her time here she has provided technical assistance to childcare centers, families in several counties and local communities hosted accreditation information sessions for more than 100 people in the multi-county region and hosted an Air Force Child Development Center Directors Conference for more than 130 worldwide participants.

The award was officially presented to Ms. Stevens Aug. 23 during the worldwide conference at Wright-Patterson Air Force Base, Ohio.

— *Information provided by WR-ALC Public Affairs*

AFRL outreach team receives national award

KIRTLAND AIR FORCE BASE, N.M. — The Air Force Research Laboratory's educational outreach team here recently received the Federal Laboratory Consortium for Technology Transfer's Excellence in Technology Transfer Award.

The office of technology transfer for education, headed by Mr. Gerald Mora and including Ms. Ronda Cole, Ms. Marla Griego and Ms. Raina Pellegrino, received the award at the consortium's annual meeting in Burlington, Vt.

The office sponsors educational outreach and mentoring programs for New Mexican students ranging from kindergarten through high school.

Since 1994, more than 49,000 students from 140 schools statewide have participated in the program.

This is not the team's first national honor. It previously received the Gen. Ronald Yates 1997 Team Award, the Air Force's highest technology transfer honor.

— *Information provided by AFRL Public Affairs*

DOD honors AFRL counterdrug efforts

ROME, N.Y. — Two Air Force Research Laboratory engineers from the information directorate's information and intelligence exploitation division here have been honored with the 2001 Defense Department Counterdrug Technology Development Program Technical Agent of the Year award.

Mr. Walter Gadz, Jr. and Mr. Herbert (John) Mucks were presented the awards during the recent Defense Department Counterdrug Technology Development Program Office annual Technical Agent Symposium.

The award is sponsored by the program office, which is responsible for developing technology and prototype systems to enhance the military's counterdrug capability. The technology is provided to civilian law enforcement agencies, consistent with the goals of the national drug control strategy and the Defense Department mission, and recognizes individuals who are effective, efficient and pro-active in executing technology programs that meet the needs of the counterdrug community.

Mr. Gadz and Mr. Mucks were cited for their teamwork throughout the development process ensuring individual software technologies were delivered as a single, seamless tool and not just individual capabilities.

The software was made available to Headquarters, U.S. Southern Command in Miami, Fla.; Headquarters, Joint Interagency Task Force-East, Key West, Fla.; and to tactical analysis teams, making it one of the most widely used data analysis and display tools in the counterdrug community.

Timeline analysis has been used for years by the defense and intelligence communities, primarily for predicting foreign government actions and responses to world events. By visualizing events in time and geographically, patterns are revealed that can be seen no other way. These patterns can help predict terrorist activity, narcotics activities, and other criminal behavior of suspects, focusing investigations and limiting wasted man-hours. Timeline analysis can also aid prosecutors in presenting clear, cohesive cases.

— *Information provided by AFRL Public Affairs*



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